

**IMPROVING STUDENT  
ACCESS TO**

**EMPOWERING,  
RIGOROUS**

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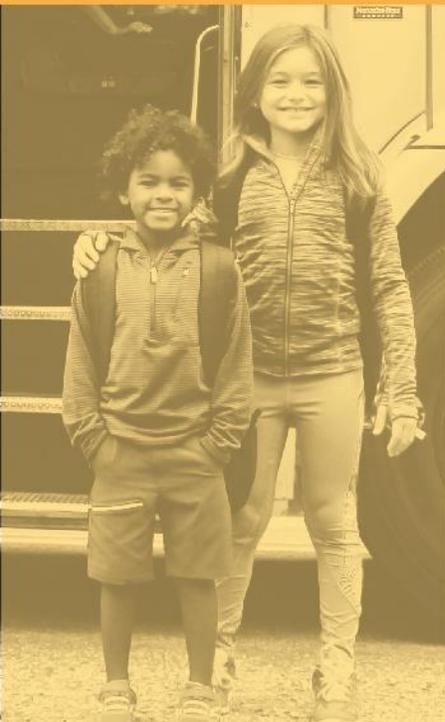
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# We are EdTrust



## **FIERCE ADVOCATES**

for education equity and justice for students of color and students from low-income families

Equity-Driven • Data-Centered • Student-Focused



The Education Trust

8/16/23

# **Embedding Equity in Middle School Advanced Coursework to foster STEM Identities**

# In today's webinar, you will:

- Learn about disparities, barriers, and promising practices from our recent report *Fostering STEM Aspirations for Students of Color in Middle School*
- Hear from the Chief Impact Officer of the KID Museum and an educator in MCPS on how to ensure more students to feel like they belong in STEM
- Consider how to extend access to exciting STEM opportunities in your district

# Panelists



Dr. Kristen Hengtgen  
Senior Policy Analyst  
The Education Trust



Dr. Dorothy Jones-Davis  
Chief Impact Officer  
KID Museum



Jo Doerman  
STEM Teacher  
Shady Grove Middle School,  
MCPS



Or go to [menti.com](https://menti.com)

Use code 2144 0768

Join at [menti.com](https://menti.com) use code 2144 0768

 Mentimeter

**When do you feel like you first  
belonged (or didn't belong) in math,  
science, or STEM?**

Waiting for responses ...



Join at [menti.com](https://menti.com) use code 2144 0768



What would it look like if all students had a sense of belonging in their middle school math and science classrooms and experiences?

21 Responses





# MIDDLE SCHOOL IS A CRITICAL MOMENT



Students decide whether they're going to college or not when they're in 7th-8th grade



Students develop or strengthen "STEM Identity" in middle school ("I am a science person," "I am a math person," "STEM is for me")



STEM identity formation is a predictor of middle school students' academic learning & identification with STEM-related careers



The stronger the sense of belonging in STEM, the stronger the academic outcomes

All middle school students should have access to high-quality, rigorous, relevant STEM courses, and all schools should have equitable policies in place for enrolling students in advanced coursework.

The problem: students of color are shut out of Algebra in middle school

- WHY?
  - Resource inequities
  - More likely to have novice teachers
  - Inequitable placement policies
  - **Unrepresentative curriculum**
  - Lack of diverse teachers

Even when students of color are in schools that have more access to algebra in middle school, they are still learning in an inequitable system.

If Black and Latino students had a fair opportunity to participate in eighth grade algebra nationwide, schools would enroll an additional **43,019** Black students and **59,452** Latino students in eighth grade algebra courses.





# WHY ALGEBRA?



Most advanced high school math trajectories begin in middle school



Algebra I is the gateway to the college-prep calculus pathway in high school (and also a gatekeeper)



Increased access to advanced math courses in HS is associated with college readiness, majoring in STEM in college, having STEM career interests, and future increased earnings



1 in 4 students will be given access to Algebra in middle school

# PROMISING PRACTICE E3 ALLIANCE, CENTRAL TX

- Found that just 1 out of 3 Black students and about half of the Latino students in Central Texas who scored at the **highest level** on the fifth grade math exam (STAAR) in 2014 had completed algebra by eighth grade, despite having demonstrated readiness
- Worked with school districts to put into practice recommendations like **promoting the advantages of advanced math** to families, **automatically enrolling** students in advanced courses, and offering **training for teachers and school counselors**
- In 2021, nearly 80% of Black and Latino students in Central Texas who scored at the highest level on the fifth grade state exam in 2017 were enrolled in eighth grade Algebra I. Participation in eighth grade Algebra I for high-performing Latino students increased by 20 percentage points, and for high-performing Black students increased by over 30 percentage points.



# Policy Recommendations



Collect & report on disaggregated data on enrollment/seats available in advanced coursework in MS



Change identification and enrollment policies to enroll more students of color



Adopt HQIM and HQPD



Require districts/schools to notify families early and often about advanced coursework opportunities, benefits, and how to enroll



Invest in infrastructure like course enrollment policies, school counselors, culturally sustaining curriculum, and PD

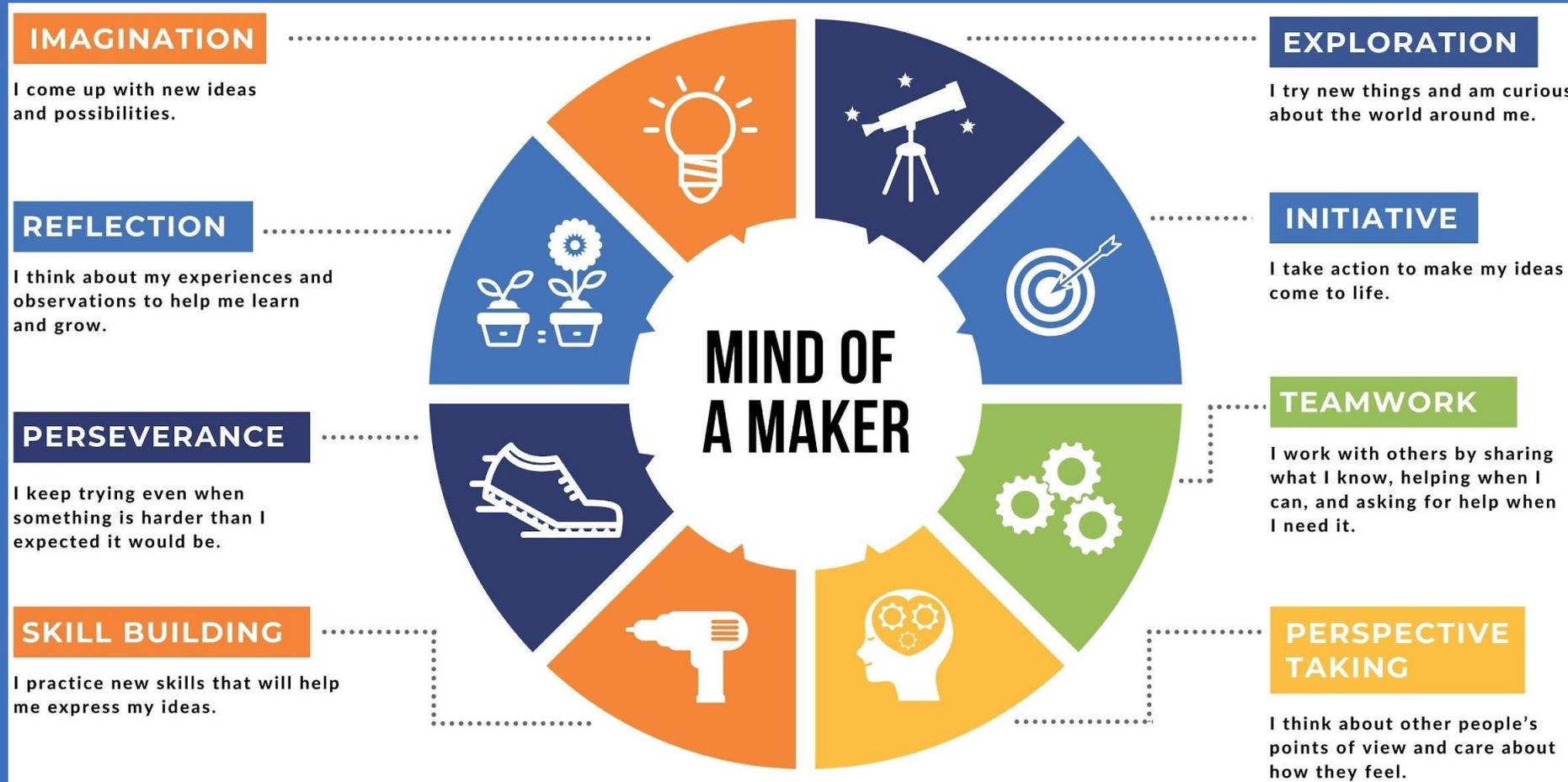
For district leaders interested in implementing more on-ramps to rigorous and accelerated coursework, see the Alliance for Resource Equity's [guidebook on Empowering Rigorous Content](#).

# KID Museum

KID Museum is an *equity-driven, educational nonprofit* on a mission to equip youth of diverse backgrounds with the skills needed to thrive in the future.



# Our Learning Philosophy



KID's hands-on, experiential learning programs unlock the **creativity, agency, and empathy** to support the next generation of innovators and changemakers. Our approach is grounded in "maker learning" — hands-on, project-based learning experiences that incorporate tech, engineering, and creative problem-solving skills.

# KID Museum's Ecosystem of Learning



Student Programs & Curriculum



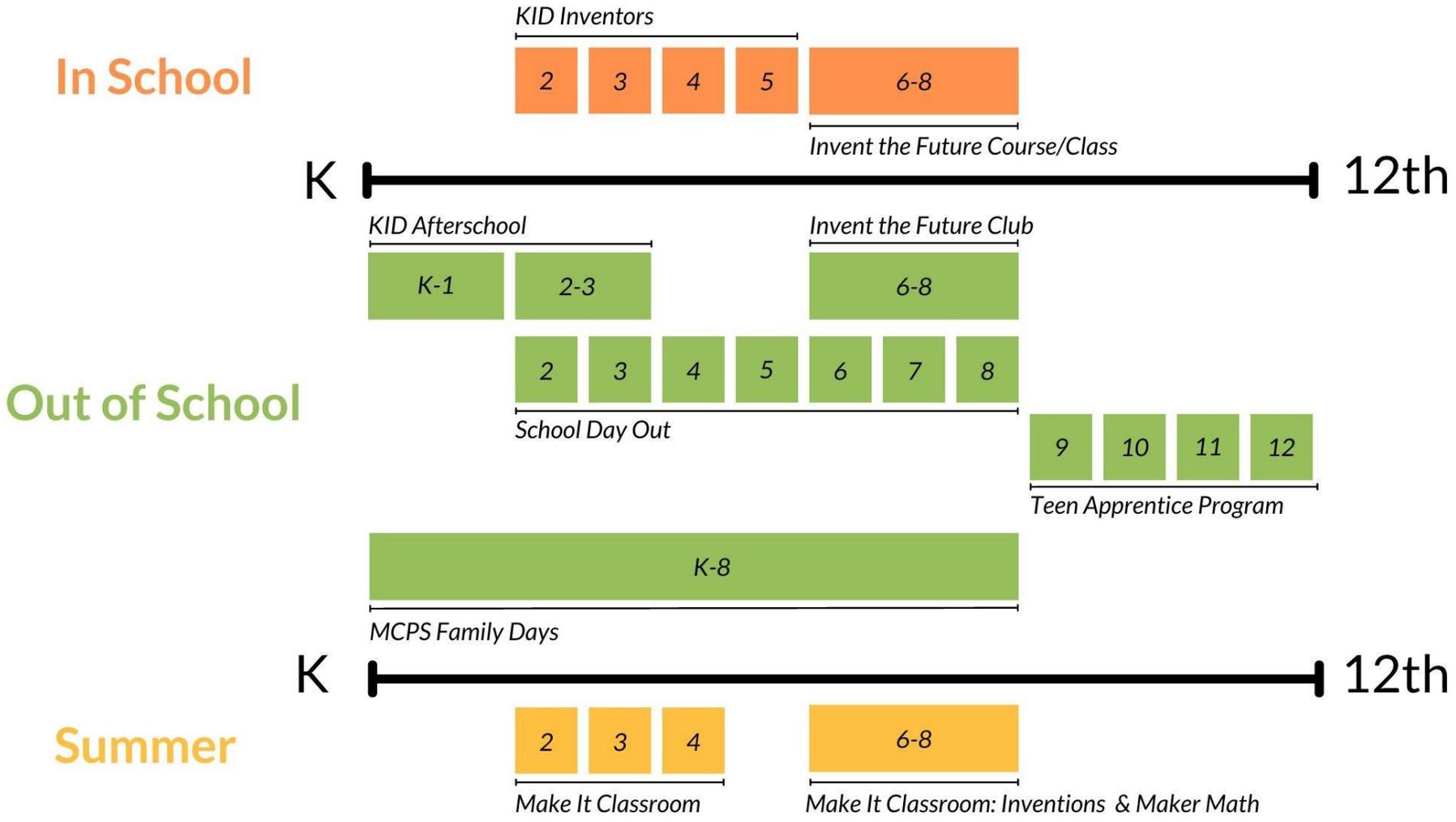
Teacher Professional Development



Family Engagement & Out of School Time Learning

*These programs come together to form a research-informed K-8 student and teacher pathway that builds sustained engagement in STEM and college/career readiness for youth traditionally underrepresented in STEM fields.*

# PARTNERSHIP CASE STUDY: KID Museum & Montgomery County (Md.) Public Schools





## WHAT WILL YOU MAKE TO IMPROVE LIFE ON THIS PLANET?

### **Invent the Future Course**

- For Grades 6-8
- Full semester course, **55+ hours of curriculum**
- 2 full day workshops at KID Museum (6 hours of instruction)
- Teacher PD
- Community showcase event

### **Invent the Future Club**

- For Grades 6-8
- In-school or afterschool club, **15+ hour curriculum + teacher add-ons**
- 2 full day workshops at KID Museum (6 hours of instruction)
- Teacher PD
- Community showcase event

## **Program Goals**

1. Increase STEM representation and engagement among lower-income students of color, especially as they prepare for high school
2. Combat the mentality that "STEM isn't for me" in students and teachers
3. Model and expand deeper, experiential, joyful learning in schools
4. Develop the Mind of a Maker in students
5. Expand educator capacity and comfort with STEM and maker learning

# Invent the Future: The Impact

- Nearly 2,000 middle school participants per year
- 21, mostly high-need middle schools in Montgomery County, Maryland
- 70% of participating students are Black and Latino
- More than half of students qualify for free or reduced-price meals at school
- Engagement & sponsorship from Google, Pepco (regional electric utility), Maryland higher ed, biohealth industry and other partners



*“As educators, we always want to provide our kids with experiential learning. Well, this is it.”*

**- Dr. Shawaan Robinson**  
Principal, Briggs Chaney Middle School / Silver Spring, Md.

**94%**

of educators reported an increase in their students' **engineering confidence & skills**

**88%**

of educators reported an increase in their students' **skills in technology**

**81%**

of educators reported an increase in their students' **critical thinking skills**

**94%**

of educators reported an increase in their students' **perseverance**

## WHAT MAKES *INVENT THE FUTURE* WORK?

1. **Open to all.** No prerequisites or tracks. Elective options are widely publicized to students and families.
2. **High-quality instructional materials.** Aligned to state standards, with formats tailored to schools' needs.
3. **Professional development for teachers.** Educators need their own confidence boost.
4. **Infrastructure to support students' interests.** KID's 28,000 sq. ft. makerspace has tools and materials that kids don't typically have at home or school.
5. **Relevant to students' lives, by design.** No menu of societal problems from which students must choose.

**"Age by no mean defines when you can or cannot invent."**

**—Dasia Taylor**

*19-year-old biohealth entrepreneur at Invent the Future's June 2023 culminating celebration*



**INVENT THE FUTURE**



# Get in touch with KID Museum

**Visit:** KID Museum

3 Bethesda Metro Center, Suite 140  
Bethesda, MD 20814

**Website:** [kid-museum.org](http://kid-museum.org)

**Follow:** @kidmuseum

**Contact:** Dorothy Jones-Davis  
Chief Impact Officer  
[dorothy@kid-museum.org](mailto:dorothy@kid-museum.org)

# APPENDIX

# PARTNERSHIP CASE STUDY: KID Museum & Montgomery County (Md.) Public Schools

	<b>Elementary</b>	<b>Middle</b>
<b>IN-SCHOOL</b>	<p><b>KID Inventors</b></p> <ul style="list-style-type: none"> <li>• 4 workshops at KID Museum</li> <li>• 6 hour in-class curriculum</li> <li>• Teacher PD</li> <li>• Community Showcase Event</li> </ul>	<p><b>Invent the Future Course</b></p> <ul style="list-style-type: none"> <li>• 4 workshops at KID Museum</li> <li>• Full semester course, 40+ hour in-class curriculum</li> <li>• Teacher PD</li> <li>• Community Showcase Event</li> </ul>
<b>OUT-OF-SCHOOL</b>	<p><b>KID Afterschool</b></p> <ul style="list-style-type: none"> <li>• 2x weekly, year-long curriculum (44 hours), delivered by teachers</li> <li>• Teacher PD</li> </ul> <p><b>School Day Out</b></p> <ul style="list-style-type: none"> <li>• Day-long workshops at KID Museum on 10 non- instructional days</li> </ul>	<p><b>Invent the Future Club</b></p> <ul style="list-style-type: none"> <li>• 4 workshops at KID Museum (8 hours of instruction)</li> <li>• 15+ hour curriculum</li> <li>• Teacher PD</li> <li>• Community Showcase Event</li> </ul>
<b>SUMMER</b>	<p><b>ES: Make It Classroom</b></p> <ul style="list-style-type: none"> <li>• Daily curriculum embedded in summer school, delivered by teachers</li> <li>• Teacher PD</li> </ul>	<p><b>MS: Make It Classroom</b></p> <ul style="list-style-type: none"> <li>• Daily curriculum embedded in summer school, delivered by teachers</li> <li>• Teacher PD</li> <li>• Two content options: <i>Inventions</i> or <i>Maker Math</i></li> </ul>



**Jo Belyea-Doerrman**

**STEM Educator**

Montgomery County Public Schools

Shady Grove Middle School

Gaithersburg, Maryland

[Jo\\_E\\_Belyea-Doerrman@mcpsmd.org](mailto:Jo_E_Belyea-Doerrman@mcpsmd.org)

**SHADY GROVE**



**MIDDLE SCHOOL**

20+ years experience working with Elementary School and Middle School Title 1 students in all aspects of Science, Technology, Engineering and Mathematics

6+ years collaboration with the Kid Museum and their Invent the Future Challenge

Project Lead the Way certified teacher for Introduction to Engineering Design, a high school level engineering course offered to middle school students

Have led a GURL Tech club that encourages girls to explore engineering / technology for over 15 years

Currently a member of the “Teach for the Future” cohort through the Kid Museum

Kid Museum has developed the “Mind of a Maker” which allows educators to easily encompass the 21st century skills into their everyday classroom

## IMAGINATION

I come up with new ideas and possibilities.

## REFLECTION

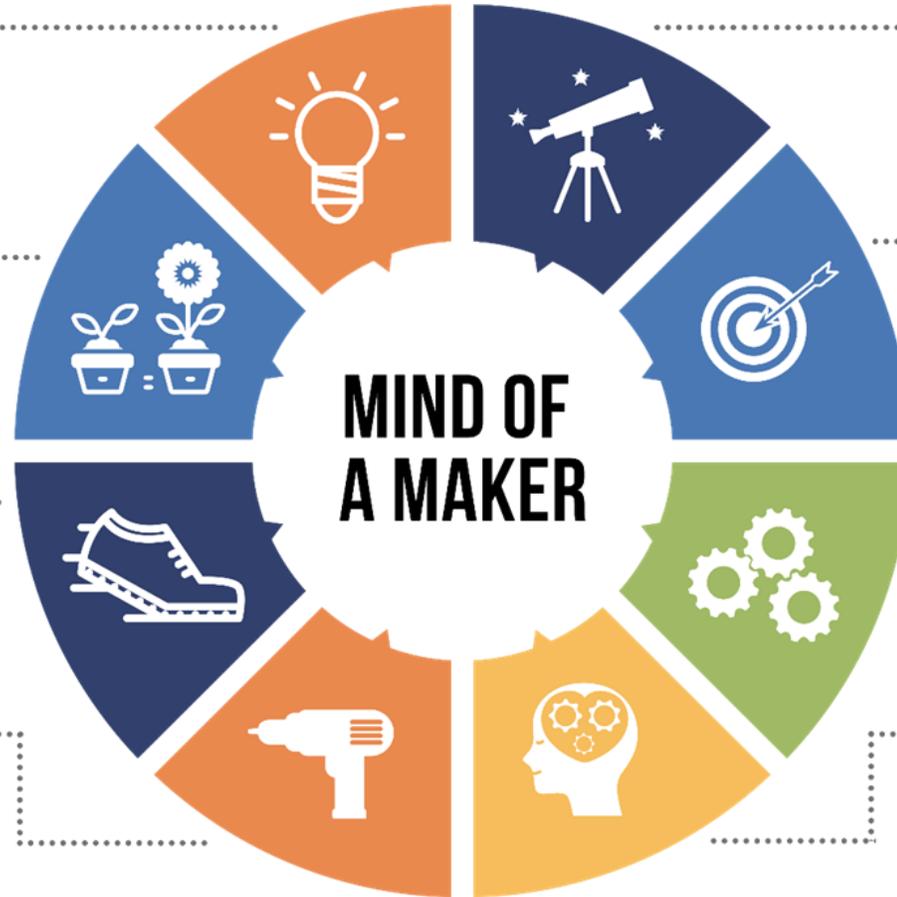
I think about my experiences and observations to help me learn and grow.

## PERSEVERANCE

I keep trying even when something is harder than I expected it would be.

## SKILL BUILDING

I practice new skills that will help me express my ideas.



## EXPLORATION

I try new things and am curious about the world around me.

## INITIATIVE

I take action to make my ideas come to life.

## TEAMWORK

I work with others by sharing what I know, helping when I can, and asking for help when I need it.

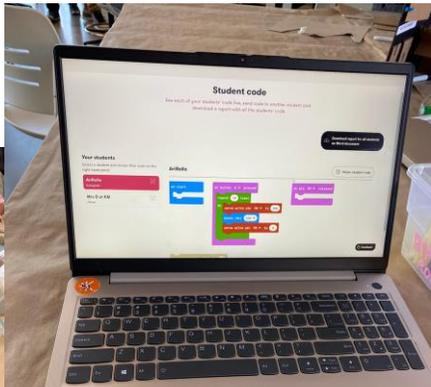
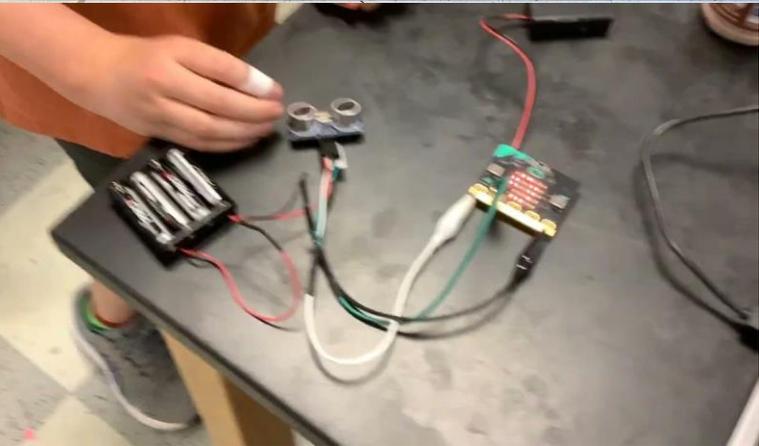
## PERSPECTIVE TAKING

I think about other people's points of view and care about how they feel.



## Invent the Future Challenge offers:

- Opportunities fo ALL students regardless of level
- Project Based Learning
- Open ended Prompt
- Allows for exploration of personal interests
- Critical Thinking
- Teamwork
- Interviews with Engineers
- Honing of a variety of Tech Skills:
  - Engineering Design Process
  - Coding
  - Cardboard Construction
  - 3D Printing
  - Circuits
  - Video Production



# Q&A

Dr. Dorothy Jones-Davis  
Chief Impact Officer, KID Museum  
&  
Jo Doerman  
STEM Teacher  
Shady Grove Middle School

# Please fill out this short survey!



<https://forms.gle/rERWRaoH6w7Wzj6H9>